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## Report of a pilot study

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# THE ABACUS AS A TOOL FOR TEACHING ARITHMETIC TO BLIND CHILDREN

## REPORT OF A PILOT STUDY

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Retardation of achievement in arithmetic has long been a characteristic of blind children at all levels of primary and secondary education. Hayes (1941) and, more recently, Nolan and Ashcroft (1959) have found achievement of blind children to be 16 percent below that of comparable groups of sighted children. The latter authors report test results which show arithmetic retardation for blind groups averages from 7 to 11 school months. Nolan (1959) has analysed differences in achievement between schools and found them to be great. In addition, he has identified many of the specific arithmetic operations where achievement is low. A number of devices and teaching techniques have been developed and tested, but, to date, all of these have failed to solve this problem.

The purpose of this project is to evaluate experimentally arithmetical achievement of elementary level blind children instructed under a new arithmetic curriculum featuring the abacus as a teaching tool. This curriculum has been successfully used in school systems for sighted children. Research results reported by Schott (1960), who developed the curriculum, have demonstrated that sighted elementary level groups instructed by this method exceed norms for achievement by an average of approximately one year.

The curriculum takes elementary children (grades 1-3) successively through the steps of counting, addition, multiplication, subtraction, and division in each of two cycles during the school year. Through use of the abacus, children are able to observe actual arithmetical operations in concrete terms and learn to describe

these operations verbally. The method takes arithmetic out of the abstract and expresses it in behavioral terms appropriate to the level of maturation of elementary level children. This is particularly important in the case of blind children in that numbers and arithmetical concepts are expressed on the abacus under the finger tips. In the case of sighted children, after learning has occurred, the abacus is discarded. For blind children it may be retained in some form as a computing tool.

## Procedure

During the past year the curriculum was used in 13 first and second grade classes of the following residential schools for the blind: Kentucky, Michigan, Missouri, Western Pennsylvania, and Virginia. In each school, grades were included only when it was possible for teachers to receive special training in the method. Both large type readers and Braille readers were involved. Because little or no printed materials were available, most instruction was carried out orally. The abacus used by the children was the Numberaid which had been especially adapted by causing the individual beads to remain in place once they had been positioned.

Arithmetic achievement was tested using the Arithmetic Computation Test, Stanford Achievement Tests, Primary Battery, Form J. The test was reproduced in 18-point type for large type readers and standard times were used. For Braille readers the test was administered orally again using standard time limits.

## Subjects

Testing was carried out in 9 class groups at 3 schools. These groups included 31 first grade and 26 second grade Braille students and 11 first grade and 11 second grade large type students. Grade placement for first graders was 1.8 and that for second graders was 2.8.

## Results

Medians and ranges of grade equivalent scores for each grade and reading

medium are presented in Table 1. Both first grade groups achieved medians above the sighted norms for the test used, the Braille readers being 2 months accelerated and large type readers being 6 months accelerated. Both groups of second graders were 2 months retarded when compared with sighted norms for the test which amounts to about 7% retardation.

TABLE 1

MEDIAN GRADE EQUIVALENT SCORES AND SCORE RANGES FOR THE GROUPS

| | Braille Readers | | Large-Type Readers | |
|---|---|---|---|---|
| | Grade 1 | Grade 2 | Grade 1 | Grade 2 |
| N | 31 | 26 | 11 | 11 |
| Median Grade Equivalent Scores | 2.0 | 2.6 | 2.4 | 2.6 |
| Range | 1.0 - 2.9 | 1.9 - 3.4 | 1.0 - 2.8 | 1.9 - 3.5 |
| Grade Placement | 1.8 | 2.8 | 1.8 | 2.8 |

## Discussion

Results obtained in this pilot study indicate that blind children can approximate or exceed sighted norms in arithmetic computation when instructed under a curriculum employing the abacus as a teaching tool. It therefore appears fruitful to continue study of the new curriculum. Present plans call for a three year study which will follow students from the first through the third grades. Additional teachers will be trained in special workshops. Workbooks for students will be made available in both large-type and Braille. Achievement testing of the groups involved will be conducted semi-annually or annually.

## References

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